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**Kim**

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(54) **APPARATUS FOR ADJUSTING NECK ANGLE OF GUITAR**

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***G10D 3/00*** (2006.01)

(52) **U.S. Cl.** ..... **84/293**; 84/267; 84/291

(58) **Field of Classification Search** ..... 84/293, 84/267, 291

See application file for complete search history.

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(57) **ABSTRACT**

Disclosed is an apparatus for adjusting a neck angle of a guitar. The apparatus comprises a support block having a receiving groove into which the neck is inserted. The support block is installed inside a lateral plate. A reinforcing plate is installed at bottom of the receiving groove of the support block. The reinforcing plate includes a central plate, a fixed plate fixed to a front face of the support block, and a guide plate guiding rotating of the neck. An adjustment device includes an adjustment bolt inserted into an adjustment hole and a thread portion formed in the adjustment hole of the central plate of the reinforcing plate so as to be thread-fastened with the adjustment bolt. A fixing device includes a fixing bolt inserted into a fixing hole and a fixing nut fixed inside the neck body and thread-fastened with the fixing bolt.

**9 Claims, 6 Drawing Sheets**

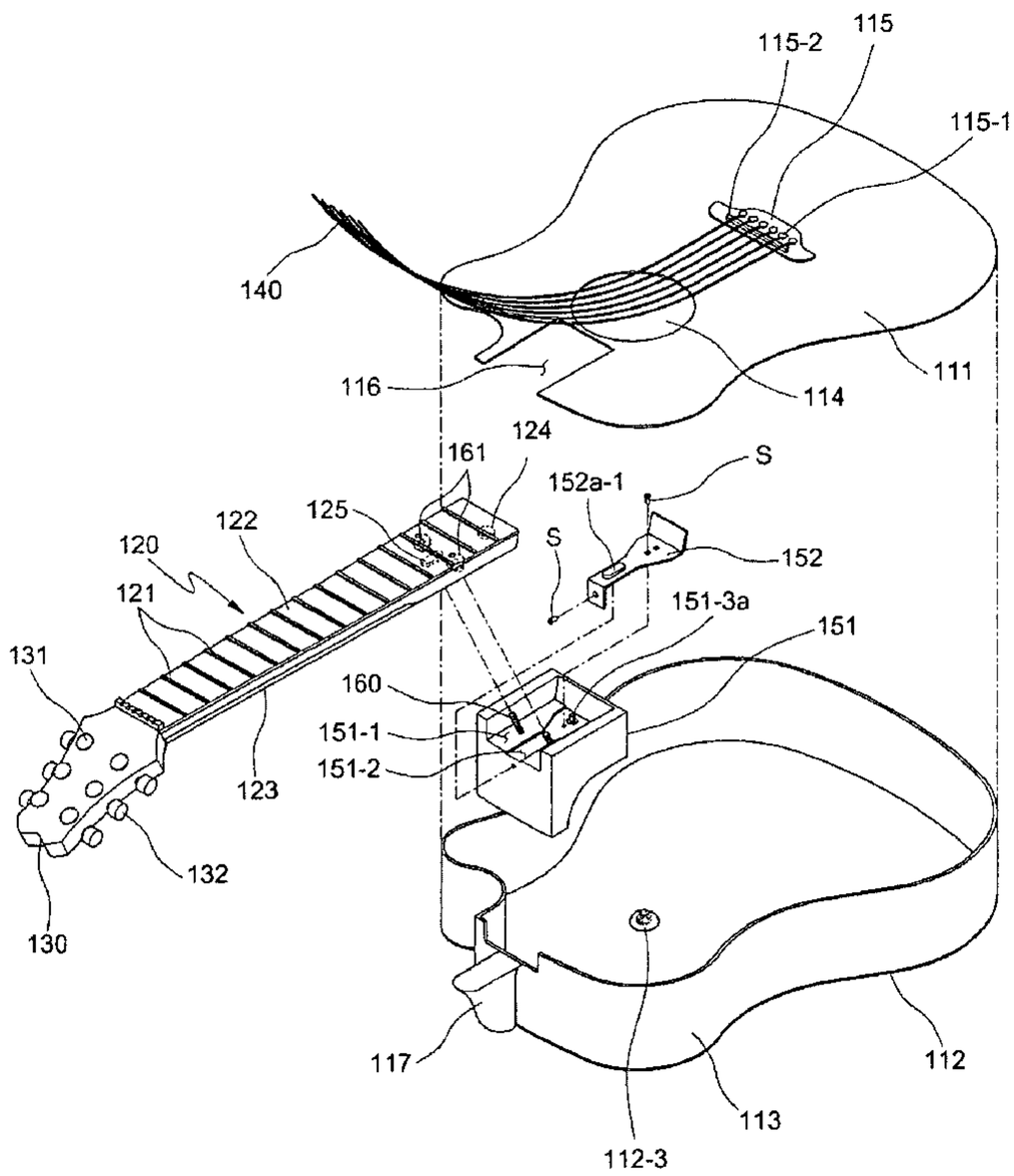

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Fig. 1

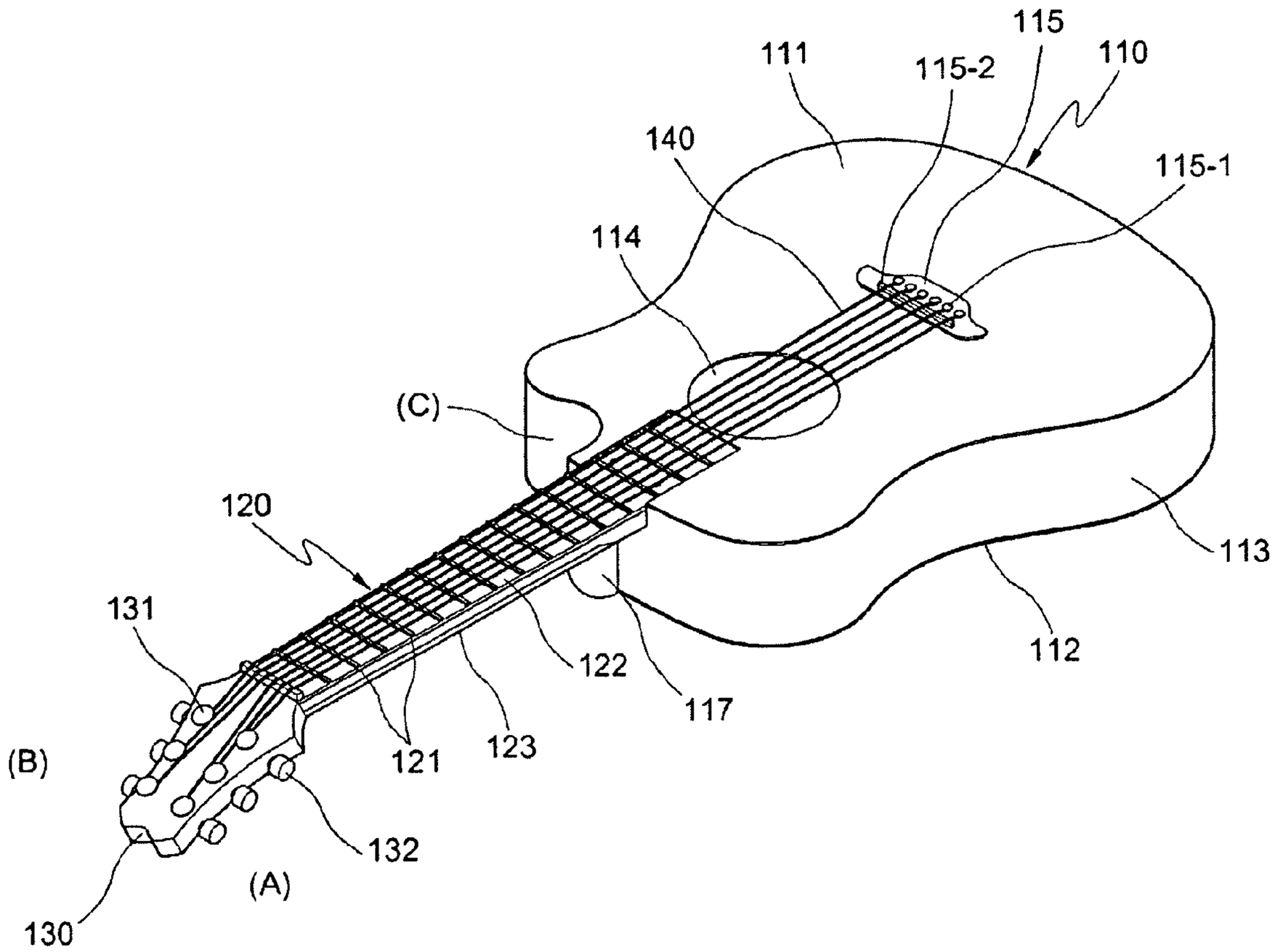

115
111
115-2
110
140
115-1
114
(C)
120
113
131
122
112
117
123
121
(B)
132
(A)
130

Fig. 2

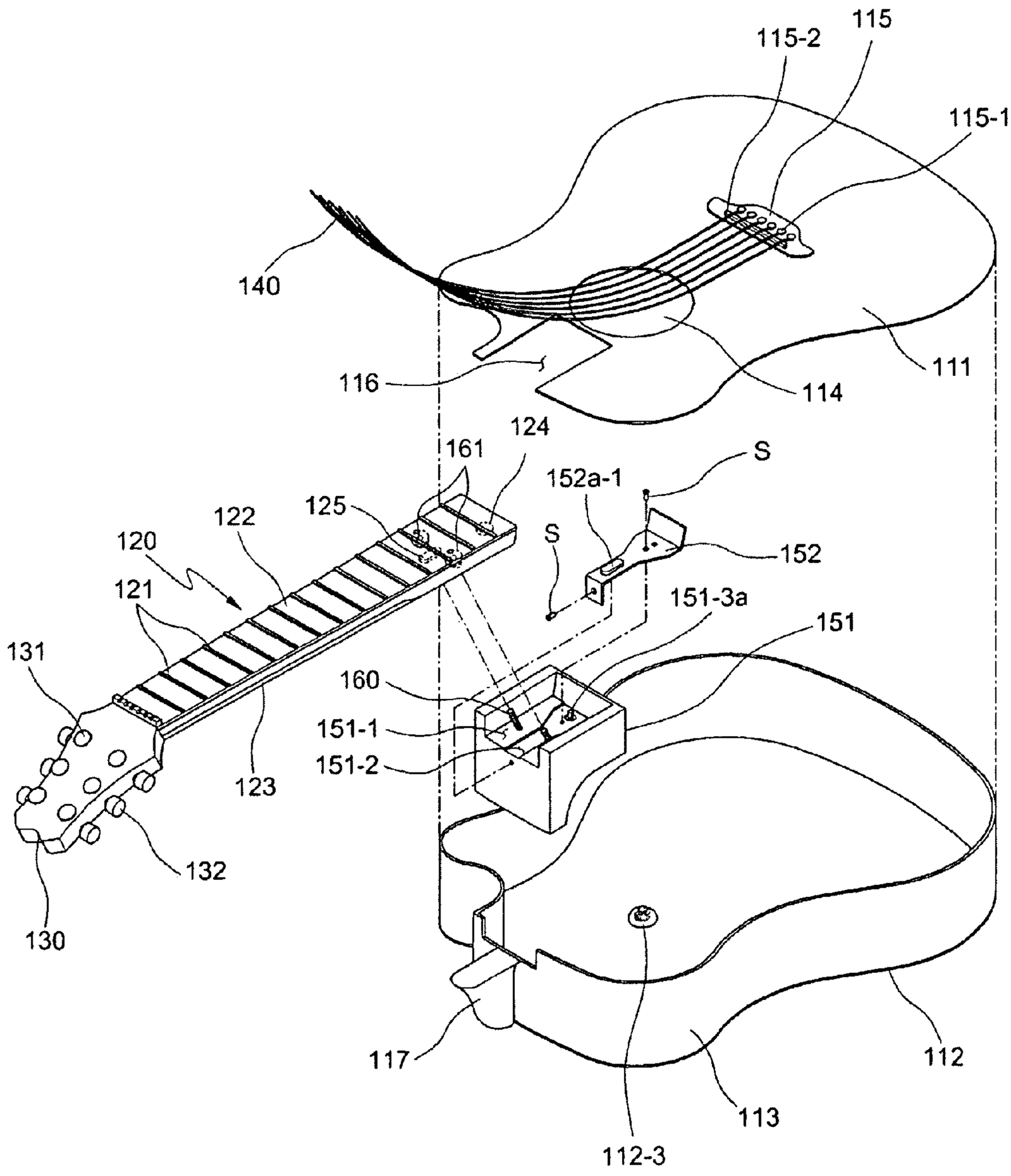

115-2
115
115-1
140
116
114
111
124
161
S
152a-1
125
122
S
152
120
121
151-3a
151
131
160
151-1
151-2
123
132
130
117
112
113
112-3

Fig. 3

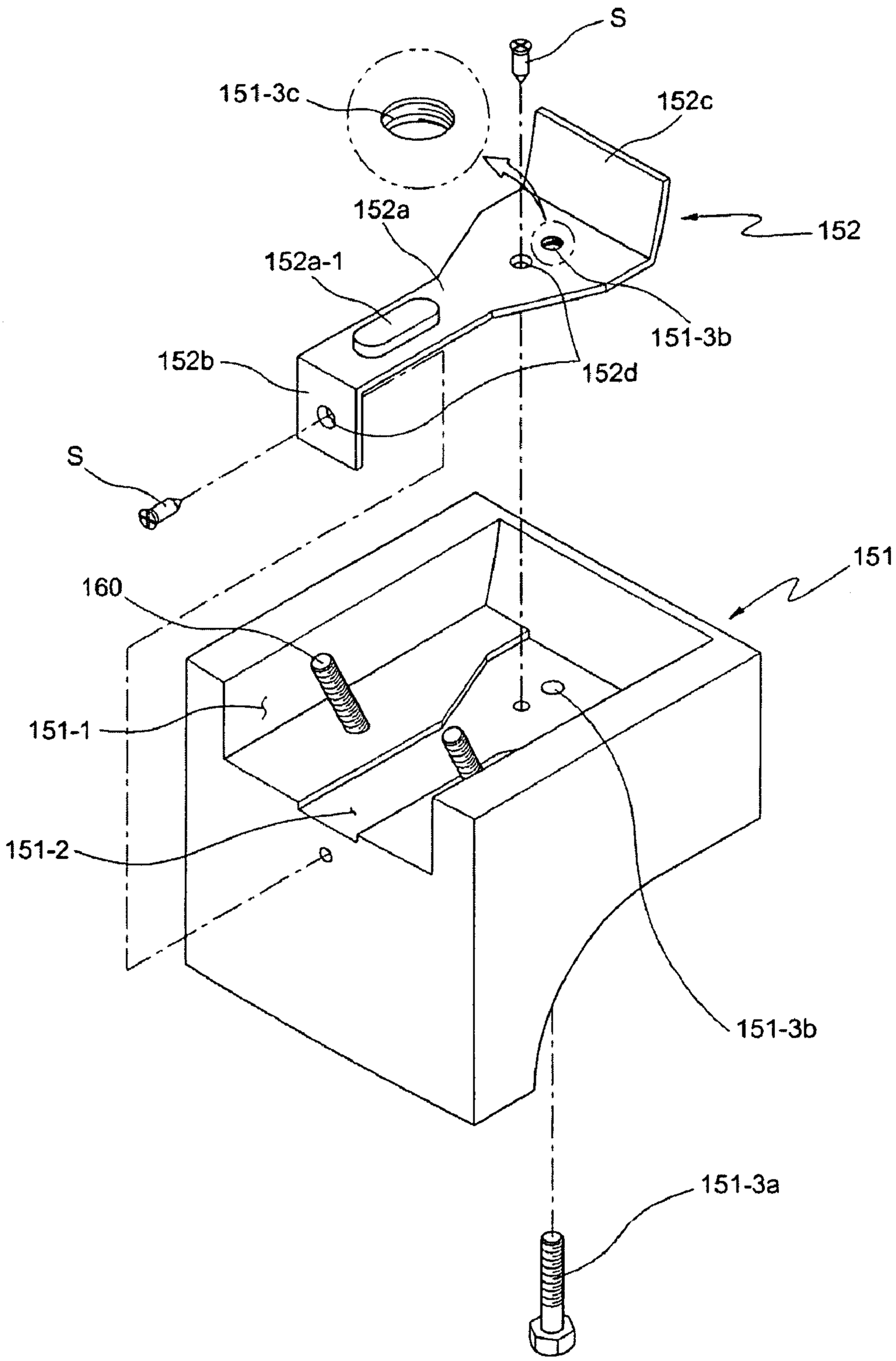
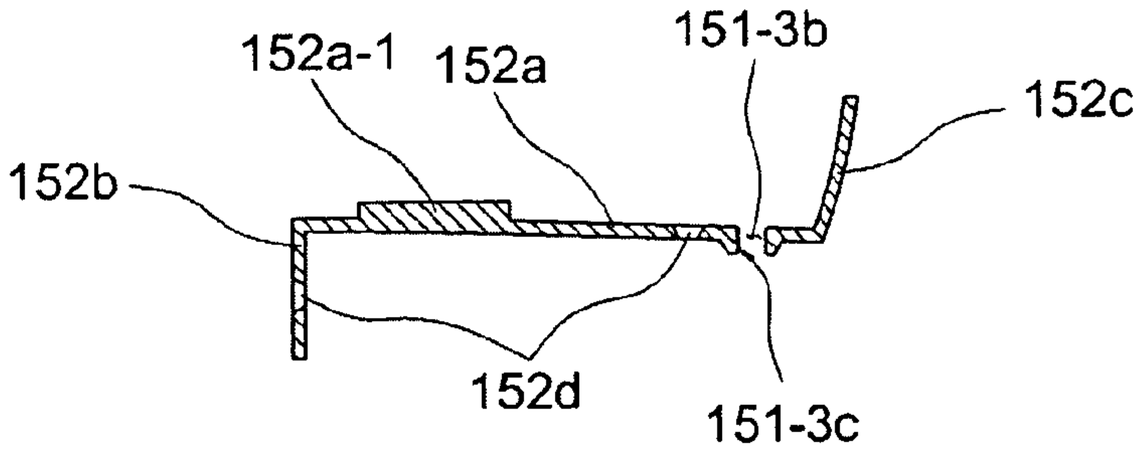

S
151-3c
152c
152a
152
152a-1
151-3b
152b
152d
S
151
160
151-1
151-2
151-3b
151-3a

Fig. 4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151-3b
152c
152b
152d
151-3c

Fig. 5

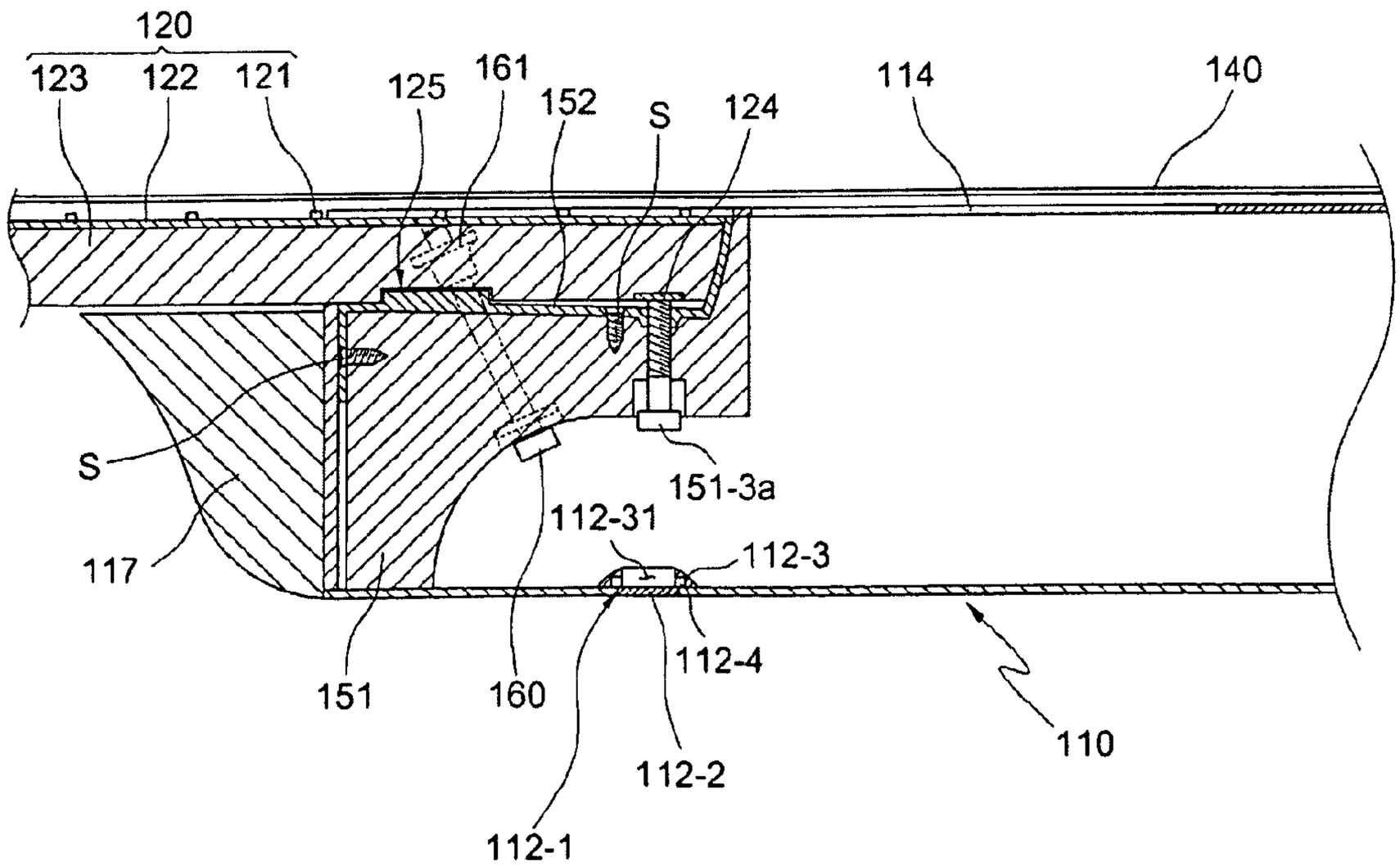
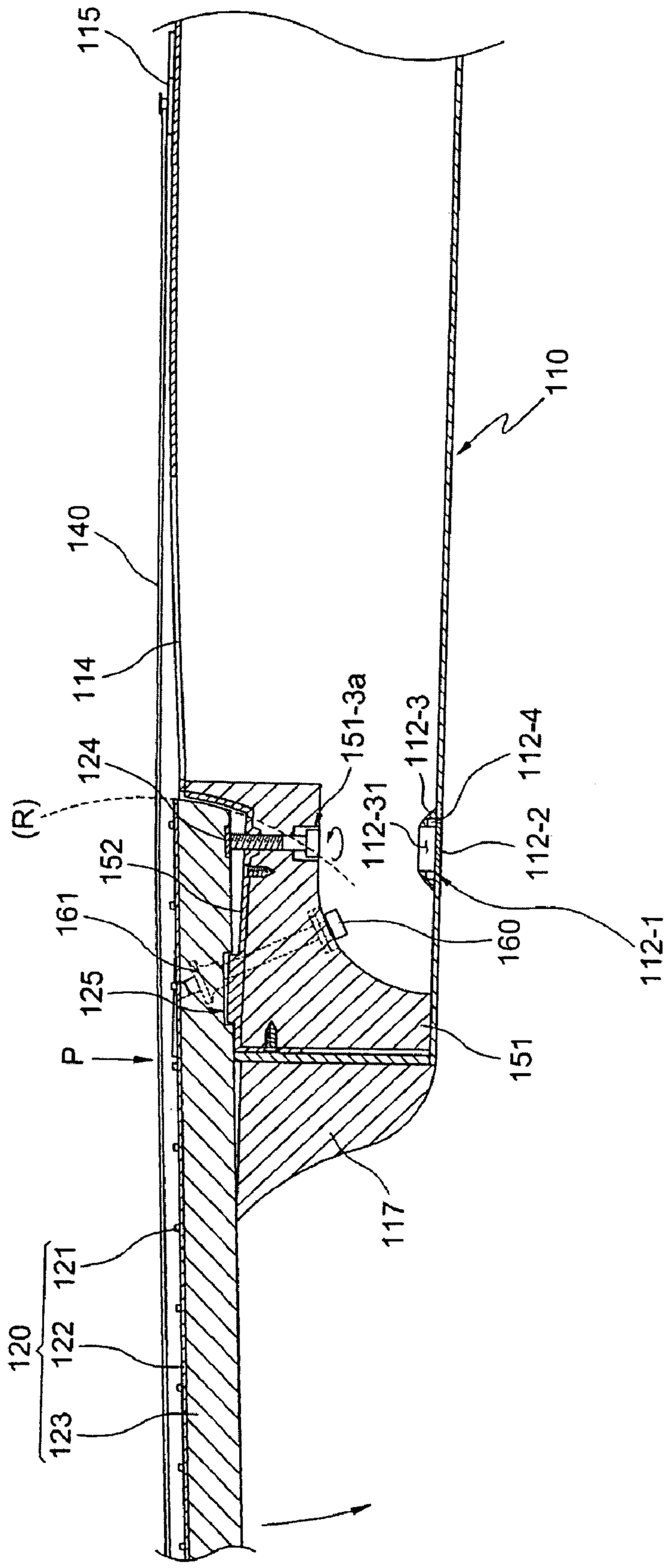

120
123
122
121
125
161
152
S
124
114
140
S
151-3a
112-31
112-3
117
151
160
112-4
112-2
110
112-1

Fig. 6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110
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124
(R)
151-3a
112-3
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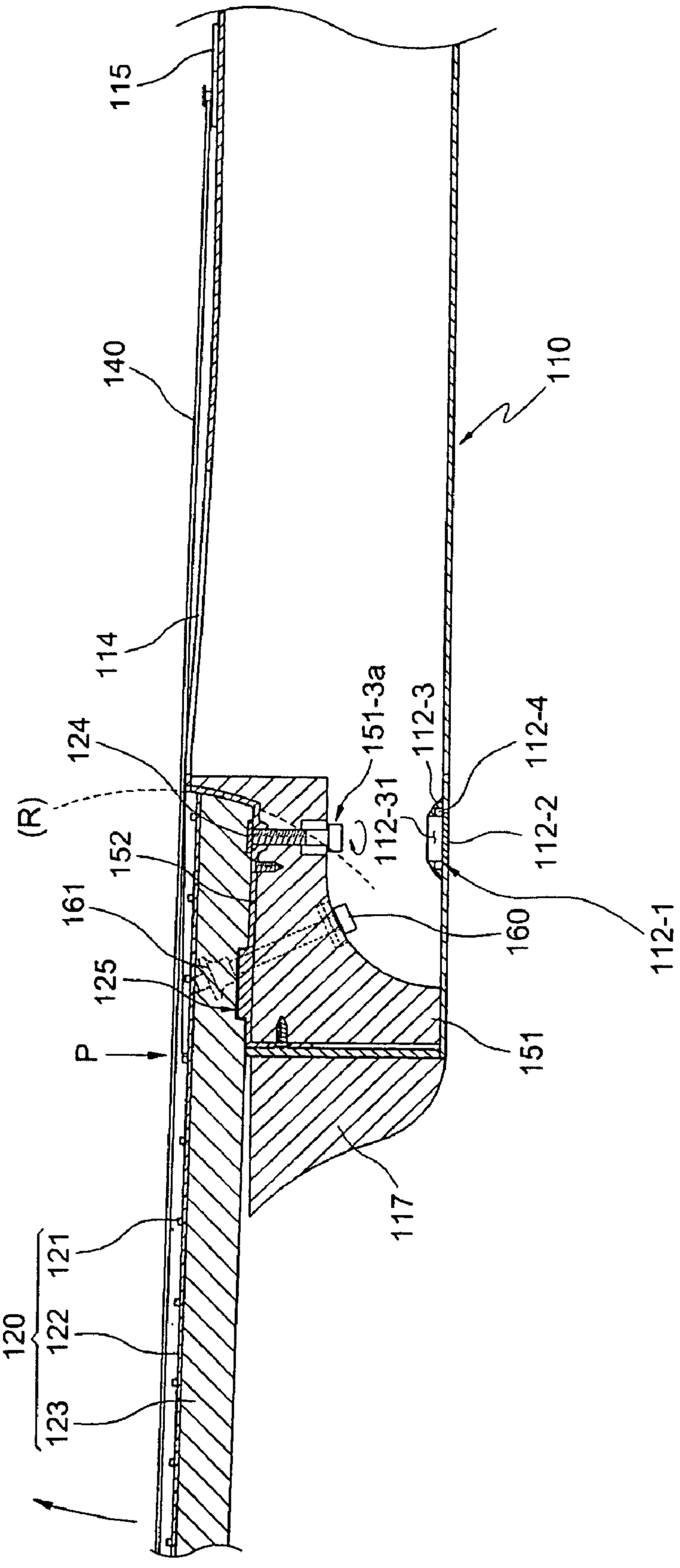
112-2
152
161
160
112-1
125
P
151
117
120
121
122
123

Fig. 7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112-31
112-2
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161
160
112-1
125
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151
117
120
121
122
123

# APPARATUS FOR ADJUSTING NECK ANGLE OF GUITAR

## CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to Korean Patent Application No. 10-2008-0076107, filed on Aug. 4, 2008.

## BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an apparatus for adjusting the neck angle of a guitar, and in more particular, an apparatus for adjusting the neck angle of a guitar, in which the neck angle can be easily adjusted in order to adjust the spacing between the finger board and the guitar strings in a guitar.

2. Background of the Related Art

In general, a guitar is one of stringed musical instruments which are familiar and close to our everyday life, and is not very expensive and can be easily played, thereby having become very popular. Such a guitar is comprised of a main body, a neck connected with the main body and having a desired length, a head formed in the end portion of the neck, guitar strings, and the like.

The main body is comprised of a top plate, a back plate and a lateral plate. A sound hole is formed in the top plate. When a guitar is being played, the sound being resonated by vibration of guitar strings is produced externally through the sound hole. A bridge is installed in the top surface of the main body. A bridge pin is installed in the bridge. A saddle is provided, on which the guitar strings are rested.

The neck includes a body having a desired thickness, a finger board formed thereon, a fret installed on top of the finger board at regular intervals, a nut installed at the end portion to the head, and the like. Further, inserted inside the body is an adjust rod for preventing the neck from bending or being distorted, which may be caused by tension of the guitar strings.

The head is provided with a head machine, which is a combination of a shaft and a string-tension adjusting tool. One end of the guitar string is connected to the bridge pin, and the other end thereof is connected with the shaft of the head machine, and rested on the upper and lower saddles. The wavelength and frequency of sound depend on the length, tension and line density of the guitar string. Thus, the sound is differentiated, depending upon positions of the fret on the finger board.

On the other hand, under the changing environment such as temperature, humidity or the like, the guitar sound can become different, due to a change in the finger board of the guitar neck and the spacing between the guitar strings, because the top plate of the main body is raised up or sagged down. In a serious situation, the guitar can not be played. Thus, when the reason or weather changes, quite often it cannot be played even if it is well-tuned.

## SUMMARY OF THE INVENTION

Accordingly, the present invention has been made in view of the above-mentioned problems occurring in the prior art, and it is a primary object of the present invention to provide an apparatus for adjusting the neck angle of a guitar, in which the neck angle can be easily adjusted in a simple way in order to adjust the spacing between the finger board and the guitar strings in a guitar.



To accomplish the above object of the present invention, according to one aspect of the present invention, there is provided an apparatus for adjusting a neck angle of a guitar, which includes a main body, a neck connected to one side of the main body, a head formed at an end portion of the neck, and a guitar string. The apparatus comprises: a support block having a receiving groove into which the neck is inserted, the support block being installed inside a lateral plate at a position corresponding to an aperture formed at one side of the main body; a reinforcing plate installed at bottom of the receiving groove of the support block, the reinforcing plate including a central plate, a fixed plate fixed to a front face of the support block, and a guide plate guiding rotating of the neck; an adjustment device for adjusting angle of the neck, the adjustment device including an adjustment bolt inserted into an adjustment hole formed from the bottom of the support block to the reinforcing plate and a thread portion formed in the adjustment hole of the central plate of the reinforcing plate so as to be thread-fastened with the adjustment bolt; and a fixing device for fixing the neck, the fixing device including a fixing bolt inserted into a fixing hole formed from the bottom of the support block to the neck body and a fixing nut fixed inside the neck body and thread-fastened with the fixing bolt.

In an embodiment, the reinforcing plate and the guide plate are bent along a circumferential circle R about a fixed point.

In an embodiment, a fixed protrusion to be inserted into an insert groove of the neck is raised in the central plate of the reinforcing plate.

In an embodiment, a support member for supporting the neck is installed outside the lateral plate at a position corresponding to the aperture.

In an embodiment, a support plate is installed at the bottom face of the neck.

According to another aspect of the invention, there is provided a guitar having a main body, a neck connected to one side of the main body, a head formed at an end portion of the neck, and a guitar string. The guitar comprises: an adjustment hole formed in a back plate of the main body; a hole plate installed inside the back plate at a position corresponding to the adjustment hole, the hole plate having a second adjustment hole at the center thereof, and a magnet installed inside the hole plate, wherein the adjustment hole is closed with a cover made of an iron plate.

As described above, since the neck angle adjustment according to the invention is configured such that an adjustment bolt is simply rotated to rotate the neck about a fixed point, the spacing between the finger board of the neck and the guitar string can be easily and conveniently adjusted. Thus, the guitar can be maintained at an optimum state, regardless of climates such as high- or low-temperature and humidity area.

Further, when the spacing between the finger board and the guitar string is adjusted, the neck rotates about the fixed point, the fret forming the fixed point never moves regardless of the neck movement, thereby not changing the tone of guitar. T his structure can sustain impact from any directions.

Furthermore, a guitar having the neck angle adjustment apparatus of the invention can be transported and maintained in an easy and convenient way since the neck and the main body can be simply assembled to or disassembled from each other.

## BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will be apparent from the following detailed

description of the preferred embodiments of the invention in conjunction with the accompanying drawings, in which:

FIG. **1** is a perspective view showing a guitar having an apparatus for adjusting the neck angle according to an embodiment of the present invention;

FIG. **2** is an exploded perspective view showing a guitar having an apparatus for adjusting the neck angle according to an embodiment of the invention;

FIG. **3** is an exploded perspective view showing an apparatus for adjusting the neck angle of a guitar according to an embodiment of the invention;

FIG. **4** is a side sectional view showing a reinforcing plate in the apparatus for adjusting the neck angle of a guitar;

FIG. **5** is a side sectional view showing the apparatus for adjusting the neck angle of a guitar; and

FIGS. **6** and **7** explain a method of adjusting the neck angle in a guitar having an apparatus for adjusting the neck angle according to an embodiment of the invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, the preferred embodiments of the invention will be described in detail with reference to the accompanying drawings.

FIG. **1** is a perspective view showing a guitar having an apparatus for adjusting the neck angle according to an embodiment of the present invention. FIG. **2** is an exploded perspective view showing a guitar having an apparatus for adjusting the neck angle according to an embodiment of the invention. FIG. **3** is an exploded perspective view showing an apparatus for adjusting the neck angle of a guitar according to an embodiment of the invention. FIG. **4** is a side sectional view showing a reinforcing plate in the apparatus for adjusting the neck angle of a guitar. FIG. **5** is a side sectional view showing the apparatus for adjusting the neck angle of a guitar.

As illustrated in the drawings, the guitar formed with an apparatus for adjusting the neck angle according to an embodiment of the invention includes a main body **110** formed with a bridge **115** to which one end of a guitar string is fixed, a neck **120** combined to one side of the main body **110**, a head **130** combined to the end portion of the neck **120**, a support block **151** installed between the main body **110** and the neck **120** to adjust the neck angle, a reinforcing plate **152** installed in the support block **151**, guitar strings **140**, and the like.

The main body **110** is comprised of a top plate **111** having a circular sound hole **114**, a back plate **112** facing the top plate **111**, and a lateral plate **113** combined with edges of the top plate **111** and the back plate **112** in a way to be spaced apart from each other. Sound resonance is generated in the internal space formed by the top plate **111**, back plate **112** and lateral plate **113**. Further, formed in one side of the main body **110** is an aperture **116**, into which the neck **120** is inserted.

An adjustment hole **112-1** is formed in the back plate **112**. A hole plate **112-3** is installed at the inner side of the back plate **112** that corresponds to the adjustment hole **112-1**. A second adjustment hole **112-31** is formed in the center of the hole plate **112-3**. A small magnet **112-4** is installed inside the hole plate **112-3**. The adjustment hole **112-1** normally remains closed with a cover **112-2** formed of an iron plate. The magnet **112-4** holds the cover **112-2** not to be easily released.

On the other hand, when the adjustment hole **112-1** is required to open in order to adjust the angle of the neck **120**, a magnet stronger than the magnet **112-4**, such as a magnet provided in a ranch cover, can be approached to the cover **112-2**, thereby being able to pull out the cover **112-2** and thus open the adjustment hole **112-1**. Details thereon will be further described hereafter.

The head **130** is formed at the end portion of the neck **120**. A head machine is installed in the head **130**. The head machine is a combination of a shaft **131**, to which one end of the guitar string is fixed, and a tension adjustment tool **132** for adjusting tension of the guitar string.

The neck **120** is comprised of a body **123** having a considerable thickness, a finger board **122** formed on top of the body **123**, a fret **121** installed on top of the finger board **122** at regular intervals, and the like. Further, installed inside the body **123** is an adjustment rod (not shown) for preventing the neck **120** from bending or being distorted by tension force of the guitar strings.

In addition, formed at the lower portion of the neck **120** are an insert groove **125**, a fixing nut **161** and a support plate **124**, which will be further described hereinafter. Such a guitar has different lengths, depending upon types or characteristics of the guitar. Accordingly, different numbers of the fret **121** are installed in the top face of the guitar.

On the other hand, a support block **151** is installed inside the lateral plate **113** that correspond to the aperture **116** formed in the main body **110**. Installed outside the lateral plate **113** corresponding to the aperture **116** is a support member **117** for supporting the neck **120**. The support block **151** is fixed to the top plate **111**, back plate **112** and lateral plate **113** of the main body **110**.

The support block **151** is formed with a receiving groove **151-1**, into which the neck **120** is inserted. Formed in the bottom of the receiving groove **151-1** is a reinforcing plate groove **151-2**, in which the reinforcing plate **152** is installed. The support block **151** is installed such that the width of its receiving groove **151-1** is aligned with the width of the aperture **116** and the bottom face of the receiving groove **151-1** is aligned with the aperture horizontal line of the lateral plate **113**.

One end portion of the neck **120** is inserted into the receiving groove **151-1** to be combined with the support block **151** and the main body **110**. The neck **120** is assembled with the main body **110** in such a manner that a fret **121** horizontal with the body line of the main body **110** is placed at the distal end of the main body **110**. The fret **121**, which is horizontal with the line of the main body **110**, may be the twelfth fret, the fourteenth fret, or the sixteenth fret, depending upon the guitar. This fret is called a fixed point P.

In this way, if the fret forming the fixed point P moves, the tone is mismatched. Therefore, in a case where the neck **120** is moved in order to adjust the spacing between the finger board **112** and the guitar string **140** in the neck, the fret **121** forming the fixed point P is not to be moved.

This embodiment of invention is configured such that the fret **121** forming the fixed point P is not to be moved, even when the neck **120** is moved to adjust the spacing between the finger board **122** and the guitar string **140** in the neck. That is, when the angle of the neck **120** is adjusted to adjust the spacing, the neck **120** is coupled to the main body **110** such that the neck **120** rotates about the fixed point P. Thus, if the neck **120** is moved to adjust the angle thereof, both ends of the neck **120** moves along the circumference of a circle R about the fixed point P. In this way, since the neck **120** rotates about the fixed point P, the fret **121** forming the fixed point P never moves even though the neck **120** rotates any further.

The reinforcing plate **152** is comprised of a central plate **152***a*, a fixed plate **152***b* which is bent at one end of the central plate **152***a* and fixed to the front face of the support block **151**, a guide plate **152***c* which is bent along the circumference of

the circle R about the fixed point P and guides rotation of the neck **120**, and a fixed protrusion **152***a*-**1** raised at the one side of the central plate **152***a*.

Such a reinforcing plate **152** is inserted into and rested on the reinforcing plate groove **151-2** formed in the bottom floor of the receiving groove **151-1** of the support block **151**. Then, a screw nail S is used to fix it to the support block **151** through coupling holes **152***d* perforated in the central plate **152***a* and the fixed plate **152***d* respectively. The depth of the reinforcing plate groove **151-2** is made identical to the thickness of the reinforcing plate **152**, so that the bottom face of the receiving groove **151-1** is horizontal with the surface of the reinforcing plate **152**.

When one end portion of the neck **120** is inserted into the receiving groove **151-1** of the support block **151** and the neck **120** is coupled with the support block **151** and the main body **110**, the fixed protrusion **152***a*-**1** raised at one side of the central plate **152***a* is inserted into the insert groove **125** formed at the lower portion of the neck **120**.

In this way, the reinforcing plate **152** is inserted into the reinforcing plate grove **151-2** at the bottom of the receiving groove **151-1** of the support block **151**. The fixed plate **152***b* is fixed to the front face of the support block **151**. Further, the fixed protrusion **152***a*-**1** raised in the central plate **152***a* is inserted into the insert groove **125** formed at the lower portion of the neck **120**. Therefore, the neck **120** and the support block **151** are firmly connected with each other, thereby enabling to sustain impact being exerted to the right and left of the head **30**.

In particular, a lengthwise impact is sustained by the reinforcing plate **152**, which is firmly fixed to the support block **151** by means of the screw nail S, and a lateral impact is sustained by the fixed protrusion **152***a*-**1**, thereby enabling to sustain the impact in any directions. In case of a cut way guitar, as illustrated in FIG. **1**, if an impact force is exerted toward the direction (B) from the direction (A) of the head **130**, the portion (C) is broken so that the guitar cannot be used. However, the structure of the invention can be applied to this cut way guitar to thereby enable to use the guitar in a safe manner.

The support block **151** is equipped with an adjustment device and a fixing device. The adjustment device is to rotate the neck **120** about the fixed point P and adjust the neck angle, and the fixing device is to fix the neck at the angle-adjusted state by the adjustment device.

The adjustment device includes an adjustment bolt **151-3***a* that is inserted into the adjustment hole **151-3***b* formed vertically from the bottom face of the support block **151** to the top face of the central plate **152***a* of the reinforcing plate **152**, and a thread portion **151-3***c* formed in the adjustment hole **151-3***b* of the central hole **151-3***b* of the central plate **152***a* of the reinforcing plate **152** so as to be thread-fastened with the adjustment bolt **151-3***a*. Preferably, the thread portion **151-3***c* is formed in such a way that the adjustment hole **151-3***b* portion of the central plate **152***a* is extruded downwardly to expand the thickness thereof, and then a taping process is carried out in the adjustment hole **151-3***b*.

The adjustment bolt **151-3***a* is inserted from the lower end of the adjustment hole **151-3***b* and thread-fastened with the thread portion **151-3***c* of the adjustment hole **151-3***b*. The adjustment bolt **151-3***a* is rotated until its upper end reaches the bottom face of the neck **120**. Then, if the adjustment bolt **151-3***a* is rotated clockwise or counterclockwise, the neck **120** rotates about the fixed point P such that the neck angle is adjusted. As illustrated in FIGS. **2**, **5**, **6** and **7**, the support plate **124** is installed in the bottom face of the neck **120**. The fixing device is comprised of a fixing bolt **160** inserted into a fixing hole (not shown), which is formed from the bottom of the support block **151** to the neck body **123** and a fixing nut **161** thread-fastened with the fixing bolt **160**. As illustrated, it is more preferable that the fixing hole is perforated with an inclination. The fixing nut **161** is fixed inside the neck body **123** such that its hole is aligned with the fixing hole.

The fixing bolt **160** is inserted from the lower end of the fixing hole formed in the support block **151** and thread-engaged with the fixing nut **161** to fasten the fixing bolt **160**. Thus, the neck **120** is fixed at the angle-adjusted state. As illustrated, it is desirable that such fixing bolt **160** and fixing nut **161** are installed in duplicate in order for the neck **120** to be firmly fixed.

Hereafter, the above apparatus for adjusting neck angle of a guitar is used as follows. FIGS. **6** and **7** explain a method of adjusting the neck angle in a guitar having the apparatus for adjusting the neck angle.

FIG. **6** illustrates a case where the top plate **111** of the main body **110** is bent in a convex fashion due to a change in the temperature and humidity, and thus the spacing between the finger board of the neck and the guitar string became larger than normal. At this state, the cover **112-2** of the adjustment hole **112-1**, which is formed in the back plate **112**, is opened and the fixing bolt **160** is made loosened using an 'L' shape ranch. Then, the adjustment bolt **151-3***a* is rotated to push the neck **120** upwardly such that the neck **120** rotates about the fixed point P and thus the head **130** side goes downward, thereby narrowing the spacing between the finger board **122** and the guitar string **140**. When the spacing between the finger board and the guitar string becomes appropriate, if the rotation of the adjustment bolt **151-3***a* is stopped and then the fixing bolt **160** is fastened, the neck **120** can be fixed at the adjusted state.

On the other hand, FIG. **7** illustrates a case where the top plate **111** of the main body **110** of the guitar **110** is bent in a concave fashion, and thus the spacing between the finger board of the neck and the guitar string became narrower than normal. At this state, the cover **112-2** of the adjustment hole **112-1** is opened and the fixing bolt **160** is made loosened using an 'L' shape ranch. Then, the adjustment bolt **151-3***a* is rotated to push the adjustment bolt **151-3***a* downwardly such that the neck **120** rotates about the fixed point P and thus the head **130** side goes upward by tension force of the guitar string **140**, thereby increasing the spacing between the finger board **122** and the guitar string **140**. When the spacing between the finger board **122** and the guitar string **140** becomes appropriate, if the rotation of the adjustment bolt **151-3***a* is stopped and then the fixing bolt **160** is fastened, the neck **120** can be fixed at the adjusted state.

As described above, since the guide plate **152***c* of the reinforcing plate **151-2** is bent upwardly along the circumference of a circle R about the fixed point, the guide plate **152***c* guides rotation of the main body **110** side end portion of the neck **120** when the neck **120** rotates about the fixed point P and the main body **110** side end portion of the neck **120** rotates along the bent inner face of the guide plate **152***c*.

In this way, since the neck angle adjustment according to the invention is configured such that an adjustment bolt is simply rotated to rotate the neck about a fixed point, the spacing between the finger board of the neck and the guitar string can be easily and conveniently adjusted. Thus, the guitar can be maintained at an optimum state, regardless of climates such as high- or low-temperature and humidity area.

Further, when the spacing between the finger board and the guitar string is adjusted, the neck rotates about the fixed point, the fret forming the fixed point never moves regardless of the

neck movement, thereby not changing the tone of guitar. This structure can sustain impact from any directions.

Furthermore, a guitar having the neck angle adjustment apparatus of the invention can be transported and maintained in an easy and convenient way since the neck and the main body can be simply assembled to or disassembled from each other.

While the present invention has been described with reference to the particular illustrative embodiments, it is not to be restricted by the embodiments but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present invention.

What is claimed is:

**1**. An apparatus for adjusting a neck angle of a guitar, which includes a main body, a neck connected to one side of the main body, a head formed at an end portion of the neck, and a guitar string, the apparatus comprising:

a support block having a receiving groove into which the neck is inserted, the support block being installed inside a lateral plate at a position corresponding to an aperture formed at one side of the main body;

a reinforcing plate installed at bottom of the receiving groove of the support block, the reinforcing plate including a central plate, a fixed plate fixed to a front face of the support block, and a guide plate guiding rotating of the neck;

an adjustment device for adjusting angle of the neck, the adjustment device including an adjustment bolt inserted into an adjustment hole formed from the bottom of the support block to the reinforcing plate and a thread portion formed in the adjustment hole of the central plate of the reinforcing plate so as to be thread-fastened with the adjustment bolt; and

a fixing device for fixing the neck, the fixing device including a fixing bolt inserted into a fixing hole formed from the bottom of the support block to the neck body and a fixing nut fixed inside the neck body and thread-fastened with the fixing bolt.

**2**. The apparatus according to claim **1**, wherein the reinforcing plate and the guide plate are bent along a circumferential circle R about a fixed point.

**3**. The apparatus according to claim **1**, wherein a fixed protrusion to be inserted into an insert groove of the neck is raised in the central plate of the reinforcing plate.

**4**. The apparatus according to claim **1**, wherein a support member for supporting the neck is installed outside the lateral plate at a position corresponding to the aperture.

**5**. The apparatus according to claim **1**, wherein a support plate is installed at the bottom face of the neck.

**6**. The apparatus according to claim **2**, wherein a support plate is installed at the bottom face of the neck.

**7**. The apparatus according to claim **3**, wherein a support plate is installed at the bottom face of the neck.

**8**. The apparatus according to claim **4**, wherein a support plate is installed at the bottom face of the neck.

**9**. A guitar having a main body, a neck connected to one side of the main body, a head formed at an end portion of the neck, and a guitar string, the guitar comprising:

an adjustment hole formed in a back plate of the main body;

a hole plate installed inside the back plate at a position corresponding to the adjustment hole, the hole plate having a second adjustment hole at the center thereof; and

a magnet installed inside the hole plate,

wherein the adjustment hole is closed with a cover made of an iron plate.

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